

MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for December, 1900, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: regular stations of the Weather Bureau, 159; West Indian service stations, 13; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Canadian Meteorological Service, 32; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service;

Commander Chapman C. Todd, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Captain François S. Chaves, Director of the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores, and W. M. Shaw, Esq., Secretary, Meteorological Office, London.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is $157^{\circ} 30'$ or $10^h 30^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Exceptionally severe weather prevailed along the steamer routes of the Atlantic and Pacific oceans during December, 1900; and from the 20th until the close of the month disastrous storms visited the British Isles and the middle-western and northwestern coasts of continental Europe.

The most important storm of the month along the Atlantic coast of the United States appeared over the west Gulf States on the 3d, reached North Carolina by the morning of the 4th, passed thence, with a marked increase in intensity, to a position off the New England coast by the morning of the 5th, and disappeared east of Newfoundland during the 6th. Storm warnings were displayed from Hatteras, N. C., to Boston, Mass., the morning of the 4th, and the displays were extended to Eastport, Me., the afternoon of the 4th. On the morning of the 5th Atlantic coast ports from Norfolk, Va., to Portland, Me., were advised as follows:

Severe southerly gales will shift to northwest off Nova Scotia this afternoon and off Newfoundland to-night. Hard gales on transatlantic tracks to midocean during Thursday.

A notable storm appeared over the west part of the Gulf of Mexico on the 12th, reached the extreme lower Mississippi Valley the morning of the 13th, and passed eastward off the northern Florida coast during the early morning of the 14th. After leaving the coast the storm moved northeastward and acquired great intensity, and on the 16th the steamship *Trini-*

dad, bound from New York to Bermuda, experienced a gale of hurricane force.

A third storm of marked strength prevailed along the North Carolina and Virginia coasts during the 21st. This storm also first appeared in the western Gulf district and advanced to the Atlantic coast. On the 20th, when the center of disturbance was crossing Alabama, storm warnings were displayed along the Atlantic coast from Savannah, Ga., to Norfolk and Westport, Va., and on the morning of the 21st, when the storm center was off Hatteras, N. C., the following message was telegraphed to Atlantic coast ports from Norfolk, Va., to Portland, Me.

Storm off Hatteras moving northeast. Easterly shifting to north-west gales off north Atlantic and Nova Scotia coasts to-night and off Newfoundland Saturday.

On the Great Lakes high winds occurred from the 7th to the 12th, and on the 23d. During the early morning of the 11th the iron ore barge *Charles Foster* foundered off Erie, Pa., and 8 persons were drowned. Ample warning was given to lake marine interests of the gales of the period December 7 to 12. The display of storm warnings was discontinued for the season on Lake Superior on the 12th, and on Lakes Michigan, Huron, Erie, and Ontario, on the 15th.

On the Pacific coast gales occurred at intervals from the 12th to the 21st, and on the 24th and 25th. On the 14th a heavy storm of wind and rain prevailed in California, and at

San Francisco wind and lightning caused considerable damage and interrupted telegraphic communication. The high winds of the month were anticipated by storm-warning displays.

The only important cold wave of December, 1900, extended from the British Northwest Territory over the interior and western parts of the country during the last three days of the month, causing frost in the valleys of southern California and in Arizona, and carrying the line of freezing temperature into northern Mexico the night of the 31st. On the morning of the 30th special warnings of cold and frost were given the widest possible distribution in southern California, Utah, and Arizona.

Heavy snow fell in the States of the lower Missouri Valley on the 22d. On the 30th, Iowa, Kansas, Nebraska, northern Missouri, and Colorado were swept by cold northerly winds and heavy snow. The storm of the 30th formed a part of the cold wave which covered the greater part of the country during the closing days of the month.

CHICAGO FORECAST DISTRICT.

Storm warnings were ordered at all upper lake ports on the 8th and on Lakes Michigan and Huron on the 12th. After the close of the general navigation season advisory messages were sent to ports on Lake Michigan, where a winter service is maintained. The only cold wave which swept the entire district developed in the British Northwest during the 29th. Cold wave warnings were sent to the extreme Northwest the afternoon of the 29th, and the warnings were extended during the next twenty-four hours over the entire district. The cold wave moved in with great force, and very low temperatures were reported at many stations.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

Storm warnings were displayed on the middle and north California coast on the 12th and 13th, and on the morning of the 14th the warnings were extended to Port Harford with advisory messages to points farther south. A storm of considerable intensity was fairly in on the north Pacific coast by the morning of the 14th. Both the storm warnings and the rain forecasts were verified. A squall of much violence passed over San Francisco about 1.20 p. m., seventh-fifth meridian time, December 14. At least six flashes of lightning were noted. The wind blew at the rate of 60 miles an hour for one minute and the velocity for five minutes was about 48 miles. The rains of the 16th, 17th, and 18th were forecast, with the exception of southern California, where forecast of showers were not verified. The heavy frosts of the 29th, 30th, and 31st were forecast, and on the morning of the 30th special warnings were sent to 73 places in Utah of much colder weather Monday morning, and to southern California and Arizona giving warning of heavy frost.—*A. G. McAdie, Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

From the 1st to the 12th the month was uneventful. From the 12th to the 21st, inclusive, a succession of severe southerly gales prevailed on the coast and high southerly winds were of frequent occurrence in the interior. A stormy period lasting forty-eight hours set in the evening of the 24th. Both stormy periods were successfully forecast, and storm warnings were displayed during the entire time of danger at the mouth of the Columbia River and at the entrance to the Strait of

Juan de Fuca, while advisory messages noting each storm's progress and development were sent as often as necessary to other seaports within the district. Many vessels remained in port during the displays, and a number of requests for special forecasts were made by masters. A few vessels proceeded to sea without heeding the warnings and their experience, together with that of other vessels which left port several days before notice of the storm's approach could be given, as well as the experience of inward bound vessels, is best told in the accompanying table (not published) compiled from the daily newspapers. The table referred to gives the names of the vessels damaged by storms during the month, and the extent of the damage caused, together with the ports arrived at and departed from with dates of arrival and departure.

A river forecast was issued on the 21st announcing a stage of about 14 feet in the Willamette on the 24th. A stage of 13.1 feet was reached on the 24th. The forecast was of value as it quieted the fears of those who thought the danger line of 15 feet would be passed.—*E. A. Beals, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During the month there were charted eleven highs and twelve lows. A brief description of their more prominent characteristics is given herewith.

Highs.—The practically permanent winter high over the Plateau region which had prevailed during more than two-thirds of the previous month, continued throughout the month with but three day's interruption, on the 14th, 20th, and 21st. There was also a high stationary on the south Atlantic coast from the 14th to the 19th, inclusive.

The principal tracks of the charted highs were either south-eastward from the British Northwest Territory to the middle Mississippi Valley, and thence eastward to the Atlantic coast between latitudes 35° and 40°, or else directly eastward across Canada. No. III divided at its place of origin in Manitoba, one section moving directly eastward over Canada to the Atlantic Ocean, and the other due southward to eastern Texas, where it dissipated. No. XI also divided after traveling to Manitoba from eastern British Columbia, one section moving eastward to central Ontario, where it disappeared, and the other southeastward by way of Lake Michigan and the State of Ohio to the southern New Jersey coast.

Nos. I, II, VII, and VIII all originated in the eastern half of the country, and were only of moderate intensity. No. VIII was a south Atlantic coast high that passed into the ocean after reaching the North Carolina coast. It was last observed about 300 miles north of the Island of Bermuda, traveling northeastward.

Lows.—All the lows, with the exception of Nos. V, IX, and XII originated west of the one hundred and tenth meridian, and five of them north of the fiftieth parallel. No. V originated in southeastern Texas, moved eastward to the Atlantic Ocean, and was last noted at the Island of Bermuda. No. IX also originated in eastern Texas, and moved eastward to the south Atlantic coast, from whence it turned northward along the coast, disappearing to the eastward after reaching the Nova Scotia coast. No. XII originated in the Texas panhandle, and dissipated in central Pennsylvania after a rapid existence of only twenty-four hours. Nos. I and XI were of a similar type. At the outset each consisted of two widely separated storms, one section originating in Alberta and the other in southeastern Texas. The lower ones moved northeastward through the east Gulf and Atlantic coast States. The two sections of No. I united over southern New York, and thence continued as one storm northeastward to the Atlantic Ocean by way of St. Johns, N. F. The lower section of No.